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*(Under International Convention.)*

Date claimed for Patent under Patents and Designs Act, 1907, being date of first Foreign Application (in Germany), } 28th Jan., 1909

Date of Application (in the United Kingdom), 27th Jan., 1910

At the expiration of twelve months from the date of the first Foreign Application, the provision of Section 91 (3) (a) of the Patents and Designs Act, 1907, as to inspection of Specification, became operative

Accepted, 1st Dec., 1910

### COMPLETE SPECIFICATION.

#### **Method of and Means for Preventing Unmeasured Quantities of Fluids from Passing the Meters.**

We, the AKTIENGESELLSCHAFT vorm. H. MEINECKE, of Postamt XII, Breslau-Carlowitz, in the Empire of Germany, Manufacturers, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 The object of this invention is to provide a method of and means for preventing unmeasured quantities of fluids from passing the meters.

In water supply installations great financial loss is caused through leakages, slow or irregularly moving valves such as float valves, unauthorized constant small tapplings from the conduits, waste from service pipes, which quantities  
10 are normally too small either to operate the meter at all or to move it sufficiently energetic so as to register.

In large water conduits the objections have been partly met by combining with the ordinary large meter a small meter for reduced flows, but even then the accuracy of measuring is limited by the small meter. Further, for service  
15 conduits small meters only can be used so that constant small waste cannot be checked by combined meters and this leads to great loss to the administrations.

In order to more fully overcome the objections and to ensure a correct operation in a combination of the kind referred to, it has been proposed to use a disc valve made to open, not gradually but suddenly and at once to a sufficiently  
20 great width to ensure that the quantity of water passing through the valve in a given unit of time shall be large enough to be correctly measured by the large meter. The usual combination valve, whether the latter be a hydraulic valve or a spring valve, is transformed into a differential valve, that is to say, a valve the equation of forces of which, when the valve is closed will represent a higher  
25 value for the difference in pressure directly in front and in the rear of the valve when the said valve is open. For this purpose the disc valve is made to cover an opening of smaller diameter and so presents differential surfaces to an equal pressure of water at front and rear of the valve, while when opening the latter the inner effective surface thereof becomes equal to its outer surface and  
30 the pressure on both sides is then alike, that is to say, the sudden opening is caused by a reduced resistance to motion after the valve is opened,

[Price 8d.]



*Means for Preventing Unmeasured Quantities of Fluids from Passing the Meters.*

For starting a meter it is necessary to have a definite velocity of flow which naturally alters according to the discharge opening. If the latter is very small, for example with leakages or only slightly opened taps and so forth, the velocity within the meter will be too weak to overcome the inertia of the member which moves the counter and so fails to set the meter into regular action. 5

In order to avoid the aforesaid objections and prevent loss, the working of the installation is regulated by the following method which can be applied equally well to conduits for other liquids or gas.

According to our new method a variable mechanical resistance which is greatest with small discharges from the conduit is applied to a piston valve. 10 This resistance is so disposed as to stop the flow from the main into the service pipe until said flow can take place with the required velocity for correct registration in the meter. Notwithstanding the stopping of the main supply, liquid can be drawn off from the service tap and so create an internal rarefaction at this side of the said resistance. The rarefaction produces an alteration of pressure 15 on the opposite sides of the resistance which grows until the resistance is balanced whereon the latter brings into play a selfacting mechanical device which suddenly brings about the reduction of said resistance. In consequence hereof the partially empty service conduit will suddenly receive a rush of liquid 20 from the main at a velocity amply sufficient to set the meter in regular action. As soon as the conditions are again normal, the full resistance will be automatically thrown into position and thereby interrupt the flow from the main into the service conduit.

For carrying the aforesaid method into practical effect, that is to say for suddenly producing a varying mechanical resistance it is necessary to provide 25 closing devices which are more strongly weighted in their closed position than in their open position.

The accompanying drawings show vertical sections of two slightly different constructions of a closing device of the kind referred to.

The construction illustrated in Figure 1 is a combination of suitable mechanism 30 with a piston valve resembling the valves heretofore used in combined watermeters for mains. The valve *g* is depressed by a slotted swinging arm *b* pivoted at *a* to a bracket *a*<sup>1</sup>. The said arm carries within its longitudinal slot a rolling weight *p* which, when the valve *g* is closed, acts at the end of a lever-arm denoted by *R*. 35

The supply of liquid from the main takes place in the direction denoted by the arrow *c*, while *d* indicates the direction of discharge. When no water is drawn off from the service conduit, the valve *g* remains closed. When, however, a small continuous discharge takes place in the service conduit, for example through leakage, the pressure above the valve *g* becomes gradually 40 reduced. As the valve *g* is weighted it cannot lift at once while the liquid runs out from the service conduit, and therefore the supply from the main is not allowed to follow. As the service conduits in buildings lead up to higher parts far above the street-main, the discharge will produce vacuum spaces in the upper parts of the conduit so that the pressure above the piston valve *g* is 45 gradually reduced until the pressure below such valve becomes sufficiently strong to slightly lift the said valve. The latter forms a tight fit in the cylindrical seat-cup *k* and allows as yet no liquid to pass through.

When the valve reaches the upper end of the cup *k* the slotted arm *b* is brought slightly above the horizontal position of its slot and the weight *p* then 50 rolls suddenly towards the pivot *a* so that the weighted lever arm *R* is reduced to an arm *r*. Owing to the sudden reduction in the weight upon the valve *g* combined with the water pressure beneath the latter from the main, the said valve is suddenly jerked open to about the position indicated by dotted lines. In this manner the rush of liquid passes with sufficient velocity to ensure accurate 55 registration by the meter.

When the pressures at both sides of the valve have become equal, the valve *g*

*Means for Preventing Unmeasured Quantities of Fluids from Passing the Meters.*

descends by reason of the slight extra weight above, so that the slotted arm *b* becomes lowered with the result that the weight *p* rolls back to the outer end and firmly closes the valve and retains same under the initial excessive weight.

Similar valves have been previously proposed as so called meter combinations, that is to say, parallel arrangements of large and small water meters in which the inflow is so controlled by a valve that large flows only pass through the main meter and small flows pass through an auxiliary meter. All these valves require for their working an auxiliary conduit with small meter and the flow of the water through the auxiliary conduit can never be completely prevented, so that with such valves the present method cannot be effected.

In the modified construction shown in Figure 2, the valve casing is fitted with a hollow piston valve *h* which is almost completely balanced by equal liquid pressures above and below because the liquid from the main passes through a hole *f* into the upper chamber *i*. The chamber *i* is closed from the service conduit *d* by a small auxiliary valve *v* which latter is controlled by a slotted pivotal arm with roller weight *p* similarly to the arrangement in Figure 1.

When no discharge takes place both valves remain closed. If the pressure in the service conduit falls, say through leakage, neither valve will open immediately until the rarefaction in the upper parts of the service conduit suddenly brings about the reduction in the charge upon valve *v* in the manner herein described with reference to Figure 1. The flow from the main will then take place through the small valve *v* and hole *f* with sufficient velocity to cause the meter to register. When large quantities are drawn off from a tap, the falling of pressure in the service conduit and in the chamber *i* cause the main pressure to open the valve *h*. When the discharge ceases the valve *h* will first close because its own weight is more than the small weight over the valve *v* in its open position, the latter closing in the manner explained with reference to Figure 1 when the velocity of the liquid falls to a predetermined minimum.

Instead of the hollow piston valve *h* an ordinary equilibrium or duplex cone valve may be adopted.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A method of preventing the escape of unmeasured quantities of liquid through liquid meters, which consists in interposing a piston valve with variable resistance between the main and the service conduit for closing the former until the pressure in the latter is reduced to a point when the main pressure balances the heaviest resistance and then causes same to shift its position so as to form a greatly reduced resistance and thereby permit of a sudden rush of liquid from the main with sufficient velocity to set the meter in operation, as set forth.

2. Means for intermittently measuring liquid so as to prevent the escape of unmeasured quantities of such liquid through liquid meters, comprising in combination with a piston valve, a variable weighted lever arm which forms a heavy pressure on the valve in its closed position and a reduced pressure on the valve in its open position, as set forth.

Dated this 27th day of January, 1910.

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Fig: 1.

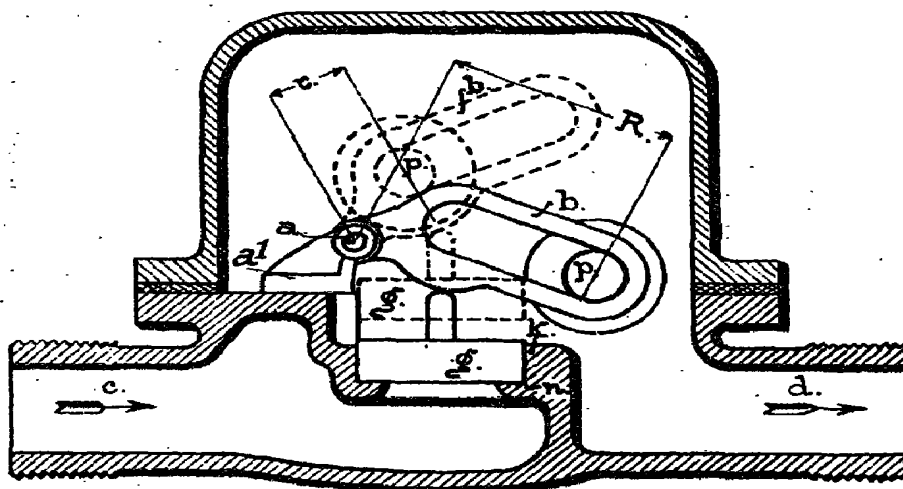
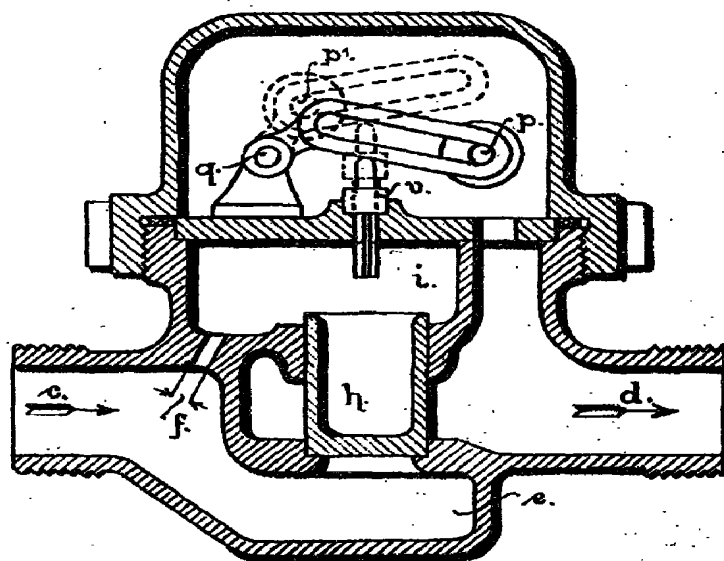


Fig: 2.



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